In [2]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt

from numpy.linalg import eig
```

In [3]:
```
L=np.array([[0,3,1.5],
            [1,0,0],
            [0,1,0.5]])
```

In [98]:
```
e_val,e_vec=eig(L)
```

In [100…
```
np.round(e_vec,2)
```

Out[100…
```
array([[-0.86,  0.8 , -0.  ],
       [-0.43, -0.53, -0.45],
       [-0.29,  0.27,  0.89]])
```

In [102…
```
np.round(np.linalg.inv(e_vec))
```

Out[102…
```
array([[-0., -1., -1.],
       [ 1., -1., -1.],
       [-0.,  0.,  1.]])
```

In [101…
```
lambda_1=np.identity(3)
for i in np.arange(3):
    lambda_1[i][i]=e_val[i]
np.round(lambda_1,2)
```

Out[101…
```
array([[ 2. ,  0. ,  0. ],
       [ 0. , -1.5,  0. ],
       [ 0. ,  0. ,  0. ]])
```

In [81]:
```
N_0=np.array([[30,10,10]]).transpose()
```

In [96]:
```
def N_k(N_0,L,k):
    e_val,e_vec=eig(L)
    e_vec_i=np.linalg.inv(e_vec)
    lambda_1=np.identity(3)
    for i in np.arange(3):
        lambda_1[i][i]=e_val[i]**k
    N_0=np.matmul(e_vec_i,N_0)
    N_0=np.matmul(lambda_1,N_0)

    return np.matmul(e_vec,N_0)
```

In [97]:
```
N_k(N_0,L,1)
```

Out[97]:
```
array([[45.],
       [30.],
       [15.]])
```

In [87]:
```
e_vec.transpose()[0][0]/np.sum(e_vec.transpose()[0])
```

Out[87]:
```
0.5454545454545454
```